

Optical imaging of three dimensional cell constructs grown in microgravity and in immunodeficient mice, Phase I

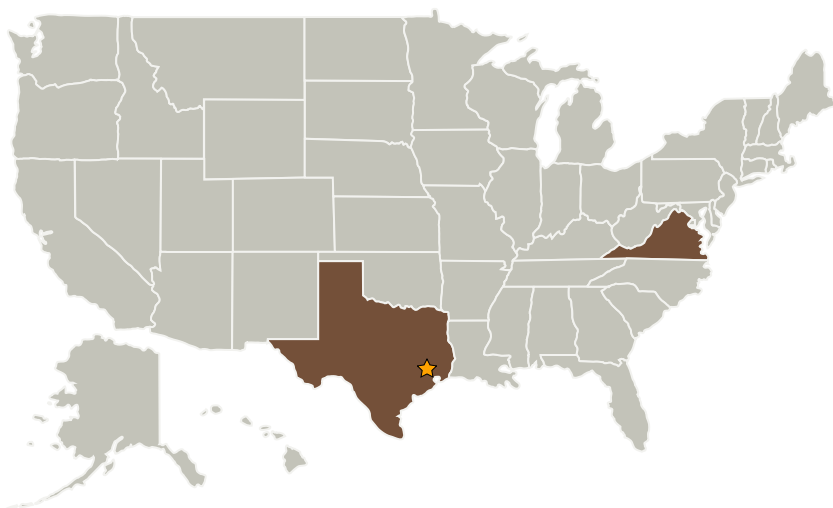
Completed Technology Project (2004 - 2004)



Project Introduction

Rolling wall vessels (RWV) utilizing both single cell lines and co-cultures with two or more cell types are contributing significantly to our understanding of tumor development, cell biology and the role of cell-cell interaction in physiological processes. These studies would be significantly enhanced if the various populations of cells could be individually identified and monitored over the course of experimentation. Optical and ultrasound technologies will be employed to monitor the development and structure of these constructs. Multiple studies could be further enhanced if it were possible to grow three dimensional constructs comprised of multiple human tissues in immunodeficient mice and image these with ultrasound and optical technologies. Constructs grown in mice may well develop far beyond what is currently possible in vitro. This could open the door for a multitude of previously impossible routes of investigation. We propose to introduce genes coding for firefly luciferase and GFP into various human cell types to allow each population to be monitored in real time over the course of experimentation. By using imaging technology to visualize and quantify different cell populations incorporated into the three dimensional constructs that are the result of RWV culture, our understanding of cell-cell interaction, anti-cancer drug efficacy and specificity and other aspects of cell biology will be greatly enhanced. By implanting these imagable three dimensional constructs into immunodeficient mice, it may be possible to continue growing these multicellular structures thereby affording researchers opportunities to study tumor and cell biology, cellular interaction and many other areas not currently possible.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Critical Care Innovations, Inc.	Supporting Organization	Industry	Chantilly, Virginia

Primary U.S. Work Locations

Texas	Virginia
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Patrick Lepivert

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.2 Energy Storage
 - └ TX03.2.2 Electrochemical: Fuel Cells